AMENDMENTS TO THE CLAIMS

Please replace all prior versions, and listings, of claims in the application with the following list of claims:

1. (Original) A system, comprising an optical fiber comprising a gain medium having a Raman active material with a Raman gain spectrum, the optical fiber being configured to receive energy at a wavelength λ_p; and

at least three pairs of reflectors disposed in the optical fiber, each pair of reflectors forming a resonance cavity with a resonance frequency, each resonance cavity having an index, the index of each resonance cavity being different than the index of the other resonance cavities,

wherein, for a resonance cavity having an index with a value M, M being an integer having a value of at least one, the resonance cavity has a resonance frequency (c/λ_{sm}), where

$$\lambda_{sm}^{-1} = \lambda_p^{-1} - \sum_M \lambda_{rm}^{-1}$$

where (c/λ_{rm}) is a frequency within the Raman gain spectrum of the Raman active material contained in the gain medium and c is the speed of light, and, for a resonance cavity having an index with a value N, N being an integer having a value of at least two, the resonance cavity has a resonance frequency (c/λ_{sn}), the resonance cavity having the index with the value N overlapping only with a resonance cavity having a resonance frequency ($c/\lambda_{s(n-1)}$) and with a resonance cavity having a resonance frequency ($c/\lambda_{s(n+1)}$) with the caveat that the resonance cavity having the highest value for N overlaps with at most one other resonance cavity.

2. (Previously Presented) The system of claim 1, wherein the optical fiber comprises four pairs of reflectors.

3. (Previously Presented) The system of claim 1, wherein the optical fiber comprises six pairs of reflectors.

4. (Previously Presented) The system of claim 1, wherein the optical fiber comprises nine pairs of reflectors.

5. (Previously Presented) The system of claim 1, wherein the optical fiber comprises greater than 10 pairs of reflectors.

6. (Previously Presented) The system of claim 1, wherein at least one pair of reflectors has a first reflector and a second reflector, the first reflector being disposed in the optical fiber closer to a point where energy at the wavelength λ_p enters the optical fiber than the second reflector, the second reflector being configured to reflect only a portion of energy impinging thereon at the resonance frequency for the resonance cavity formed by the at least one pair of reflectors.

7. (Previously Presented) The system of claim 6, wherein the first reflector is configured to reflect substantially all energy impinging thereon at the resonance frequency for the resonance cavity formed by the at least one pair of reflectors.

8. (Previously Presented) The system of claim 6, wherein the second reflector is configured to reflect less than 98% of the energy impinging thereon at the resonance frequency for the resonance cavity formed by the at least one pair of reflectors.

9. (Previously Presented) The system of claim 6, wherein the second reflector is configured to reflect less than 95% of the energy impinging thereon at the resonance frequency for the resonance cavity formed by the at least one pair of reflectors.

10. (Previously Presented) The system of claim 6, wherein the second reflector is configured to reflect less than 90% of the energy impinging thereon at the resonance frequency for the resonance cavity formed by the at least one pair of reflectors.

11. (Previously Presented) The system of claim 6, wherein the second reflector is configured to reflect less than 50% of the energy impinging thereon at the resonance frequency for the resonance cavity formed by the at least one pair of reflectors.

12. (Previously Presented) The system of claim 6, wherein the second reflector is configured to reflect less than 25% of the energy impinging thereon at the resonance frequency for the resonance cavity formed by the at least one pair of reflectors.

13. (Previously Presented) The system of claim 6, wherein the amount of energy at the resonance frequency for the resonance cavity that the second reflector is capable of reflecting is variable.

14. (Previously Presented) The system of claim 1, wherein each pair of reflectors has a first reflector and a second reflector, and for each pair of reflectors: the first reflector is disposed in the optical fiber closer to a point where energy at the wavelength λ_p enters the optical fiber than the second reflector and the second reflector is configured to reflect only a portion of energy impinging thereon at the resonance frequency for the resonance cavity formed by the first and second reflectors.

15. (Previously Presented) The system of claim 14, wherein the first reflector is configured to reflect substantially all energy impinging thereon at the resonance frequency for the resonance cavity formed by the at least one pair of reflectors.

16. (Previously Presented) The system of claim 14, wherein the second reflector is configured to reflect less than 98% of the energy impinging thereon at the resonance frequency for the resonance cavity formed by the first and second reflectors.

17. (Previously Presented) The system of claim 14, wherein the second reflector is configured to reflect less than 95% of the energy impinging thereon at the resonance frequency for the resonance cavity formed by the first and second reflectors.

18. (Previously Presented) The system of claim 14, wherein the second reflector is configured to reflect less than 90% of the energy impinging thereon at the resonance frequency

for the resonance cavity formed by the first and second reflectors.

19. (Previously Presented) The system of claim 14, wherein the second reflector is configured to reflect less than 50% of the energy impinging thereon at the resonance frequency for the resonance cavity formed by the first and second reflectors.

20. (Previously Presented) The system of claim 14, wherein the second reflector is configured to reflect less than 25% of the energy impinging thereon at the resonance frequency for the resonance cavity formed by the first and second reflectors.

21. (Previously Presented) The system of claim 14, wherein the amount of energy at the resonance frequency for the resonance cavity that the second reflector is capable of reflecting is variable.

22. (Previously Presented) The system of claim 1, wherein at least one resonance cavity has a suppressor disposed therein, the suppressor being configured to substantially suppress formation of energy at a frequency (c/λ_x) where

$$\lambda_x^{-1} = \lambda_z^{-1} - \lambda_a^{-1},$$

(c/λ_z) is a resonance frequency of the at least one resonance cavity and (c/λ_a) is a frequency in the Raman gain spectrum of the active material in the gain medium in the optical fiber.

23. (Previously Presented) The system of claim 1, wherein, for each resonance cavity, the resonance cavity has a suppressor disposed therein, the suppressor being configured to substantially suppress formation of energy at a frequency in the Raman gain spectrum of the active material in the gain medium in the optical fiber.

24. (Previously Presented) The system of claim 1, wherein one pair of reflectors has first and second reflectors, the first and second reflectors being configured to reflect substantially

all energy impinging thereon at the resonance frequency of the corresponding resonance cavity.

25. (Previously Presented) The system of claim 1, wherein the at least three pairs of reflectors includes a first pair of reflectors and a second pair of reflectors, the first pair of reflectors having first and second reflectors, the second pair of reflectors having first and second reflectors, the first and second reflectors of the first pair of reflectors being configured to reflect substantially all energy impinging thereon at the resonance frequency of the resonance cavity formed by first pair of reflectors, and the first and second reflectors of the second pair of reflectors being configured to reflect substantially all energy impinging thereon at the resonance frequency of the resonance cavity formed by the second pair of reflectors.

26. (Previously Presented) The system of claim 1, wherein the at least three pairs of reflectors includes a first pair of reflectors, a second pair of reflectors and a third pair of reflectors, the first pair of reflectors having first and second reflectors, the second pair of reflectors having first and second reflectors, the third pair of reflectors having first and second reflectors, the first and second reflectors of the first pair of reflectors being configured to reflect substantially all energy impinging thereon at the resonance frequency of the resonance cavity formed by the first pair of reflectors, the first and second reflectors of the second pair of reflectors being configured to reflect substantially all energy impinging thereon at the resonance frequency of the resonance cavity formed by the second pair of reflectors, and the first and second reflectors of the third pair of reflectors being configured to reflect substantially all energy impinging thereon at the resonance frequency of the resonance cavity formed by the third pair of reflectors.

27. (Previously Presented) The system of claim 1, further comprising an additional reflector disposed in the optical fiber, the additional reflector being configured to at least partially reflect energy impinging thereon at the wavelength λ_p.

28. (Previously Presented) The system of claim 1, further comprising an additional reflector disposed in the optical fiber, the additional reflector being configured to reflect

substantially all energy impinging thereon at the wavelength λ_p.

29. (Currently Amended) The system of claim 1, wherein at least one of the pairs of reflectors comprise pairs of fiber Bragg gratings.

30. (Previously Presented) The system of claim 1, wherein the Raman active material is selected from the group consisting of GeO_2 and P_2O_5.

31. (Original) The system of claim 1, further comprising:

an energy source configured to emit energy at a wavelength λ_p; wherein

the optical fiber is configured to receive energy from the energy source at the wavelength λ_p.

32. (Original) The system of claim 31, wherein the energy source comprises a laser.

33. (Original) The system of claim 31, wherein the energy source is capable of lasing at the wavelength λ_p.

34. (Currently Amended) A system comprising an optical fiber comprising a gain medium having a Raman active material, the optical fiber being configured to receive energy at a wavelength λ_p; and

at least three pairs of reflectors disposed in the optical fiber, each pair of reflectors forming a corresponding resonance cavity with a corresponding resonance frequency, the resonance frequency of each resonance cavity being different than the resonance frequency of any other cavity,

wherein the optical fiber is substantially devoid of a ~~portion containing~~location that is included in more than two of the resonance cavities.

35. (Previously Presented) The system of claim 34, wherein the optical fiber comprises

four pairs of reflectors.

36. (Previously Presented) The system of claim 34, wherein the optical fiber comprises six pairs of reflectors.

37. (Previously Presented) The system of claim 34, wherein the optical fiber comprises eight pairs of reflectors.

38. (Previously Presented) The system of claim 34, wherein the optical fiber comprises greater than 10 pairs of reflectors.

39. (Previously Presented) The system of claim 34, wherein at least one pair of reflectors has a first reflector and a second reflector, the first reflector being disposed in the optical fiber closer to a point where energy at the wavelength λ_p enters the optical fiber than the second reflector, the second reflector being configured to reflect only a portion of energy impinging thereon at the resonance frequency for the resonance cavity formed by the at least one pair of reflectors.

40. (Previously Presented) The system of claim 39, wherein the first reflector is configured to reflect substantially all impinging thereon at the resonance frequency for the resonance cavity formed by the at least one pair of reflectors.

41. (Previously Presented) The system of claim 39, wherein the second reflector is configured to reflect less than 98% of the energy impinging thereon at the resonance frequency for the resonance cavity formed by the at least one pair of reflectors.

42. (Previously Presented) The system of claim 39, wherein the second reflector is configured to reflect less than 95% of the energy impinging thereon at the resonance frequency for the resonance cavity formed by the at least one pair of reflectors.

43. (Previously Presented) The system of claim 39, wherein the second reflector is configured to reflect less than 90% of the energy impinging thereon at the resonance frequency for the resonance cavity formed by the at least one pair of reflectors.

44. (Previously Presented) The system of claim 39, wherein the second reflector is configured to reflect less than 50% of the energy impinging thereon at the resonance frequency for the resonance cavity formed by the at least one pair of reflectors.

45. (Previously Presented) The system of claim 39, wherein the second reflector is configured to reflect less than 10% of the energy impinging thereon at the resonance frequency for the resonance cavity formed by the at least one pair of reflectors.

46. (Previously Presented) The system of claim 39, wherein the amount of energy at the resonance frequency for the resonance cavity that the second reflector is capable of reflecting is variable.

47. (Previously Presented) The system of claim 34, wherein each pair of reflectors has a first reflector and a second reflector, and for each pair of reflectors: the first reflector is disposed in the optical fiber closer to a point where energy at the wavelength λ_p enters the optical fiber than the second reflector and the second reflector is configured to reflect only a portion of energy impinging thereon at the resonance frequency for the resonance cavity formed by the first and second reflectors.

48. (Previously Presented) The system of claim 47, wherein the first reflector is configured to reflect substantially all energy impinging thereon at the resonance frequency for the resonance cavity formed by the first and second reflectors.

49. (Previously Presented) The system of claim 47, wherein the second reflector is configured to reflect less than 98% of the energy impinging thereon at the resonance frequency for the resonance cavity formed by the first and second reflectors.

50. (Previously Presented) The system of claim 47, wherein the second reflector is configured to reflect less than 95% of the energy impinging thereon at the resonance frequency for the resonance cavity formed by the first and second reflectors.

51. (Previously Presented) The system of claim 47, wherein the second reflector is configured to reflect less than 90% of the energy impinging thereon at the resonance frequency for the resonance cavity formed by the first and second reflectors.

52. (Previously Presented) The system of claim 47, wherein the second reflector is configured to reflect less than 60% of the energy impinging thereon at the resonance frequency for the resonance cavity formed by the first and second reflectors.

53. (Previously Presented) The system of claim 47, wherein the second reflector is configured to reflect less than 25% of the energy impinging thereon at the resonance frequency for the resonance cavity formed by the first and second reflectors.

54. (Previously Presented) The system of claim 47, wherein the amount of energy at the resonance frequency for the resonance cavity that the second reflector is capable of reflecting is variable.

55. (Previously Presented) The system of claim 34, wherein at least one resonance cavity has a suppressor disposed therein, the suppressor being configured to substantially suppress formation of energy at a frequency (c/λ_x) where

$$\lambda_x^{-1} = \lambda_z^{-1} - \lambda_a^{-1},$$

(c/λ_z) is a resonance frequency of the at least one resonance cavity and (c/λ_a) is a frequency in a Raman gain spectrum of the active material in the gain medium in the optical fiber.

56. (Previously Presented) The system of claim 55, wherein the suppressor comprises one or more long period gratings.

57. (Previously Presented) The system of claim 34, wherein, for each resonance cavity, the resonance cavity has a suppressor disposed therein, the suppressor being configured to substantially suppress formation of energy at a frequency in the Raman gain spectrum of the active material in the gain medium in the optical fiber.

58. (Previously Presented) The system of claim 34, wherein one pair of reflectors has first and second reflectors, the first and second reflectors being configured to reflect substantially all energy impinging thereon at the resonance frequency of the resonance cavity formed by the pair of reflectors.

59. (Previously Presented) The system of claim 34, wherein the at least three pairs of reflectors includes a first pair of reflectors and a second pair of reflectors, the first pair of reflectors having first and second reflectors, the second pair of reflectors having first and second reflectors, the first and second reflectors of the first pair of reflectors being configured to reflect substantially all energy impinging thereon at the resonance frequency of the resonance cavity formed by the first pair of reflectors, and the first and second reflectors of the second pair of reflectors being configured to reflect substantially all energy impinging thereon at the resonance frequency of the resonance cavity formed by the second pair of reflectors.

60. (Previously Presented) The system of claim 34, wherein the at least three pairs of reflectors includes a first pair of reflectors, a second pair of reflectors and a third pair of reflectors, the first pair of reflectors having first and second reflectors, the second pair of reflectors having first and second reflectors, the third pair of reflectors having first and second reflectors, the first and second reflectors of the first pair of reflectors being configured to reflect substantially all energy impinging thereon at the resonance frequency of the resonance cavity formed by the first pair of reflectors, the first and second reflectors of the second pair of reflectors being configured to reflect substantially all energy impinging thereon at the resonance

frequency of the resonance cavity formed by the second pair of reflectors, and the first and second reflectors of the third pair of reflectors being configured to reflect substantially all energy impinging thereon at the resonance frequency of the resonance cavity formed by the third pair of reflectors.

61. (Previously Presented) The system of claim 34, further comprising an additional reflector disposed in the optical fiber, the additional reflector being configured to at least partially reflect energy impinging thereon at the wavelength λ_p.

62. (Previously Presented) The system of claim 34, further comprising an additional reflector disposed in the optical fiber, the additional reflector being configured to reflect substantially all energy impinging thereon at the wavelength λ_p.

63. (Previously Presented) The system of claim 34, wherein at least one pair of reflectors comprise pairs of fiber Bragg gratings.

64. (Previously Presented) The system of claim 34, wherein each pair of reflectors comprises a pair of fiber Bragg gratings.

65. (Previously Presented) The system of claim 34, wherein the Raman active material is selected from the group consisting of GeO_2 and P_2O_5.

66. (Original) The system of claim 34, further comprising:

an energy source configured to emit energy at a wavelength λ_p; wherein

the optical fiber is configured so that energy emitted by the energy source at the λ_p can be coupled into the optical fiber.

67. (Original) The system of claim 66, wherein the energy source comprises a laser.

68. (Original) The system of claim 66, wherein the energy source is capable of lasing at the wavelength λ_p.

69. (Currently Amended) A system, comprising:

a fiber comprising an optical fiber comprising a plurality of sections including a first section having a gain medium including a first Raman active material and a second section having a gain medium including a second Raman active material, the optical fiber being configured to receive energy at a wavelength λ_p; and

at least three pairs of reflectors disposed in the optical fiber, each pair of reflectors forming a corresponding resonance cavity with a corresponding resonance frequency,

wherein the optical fiber is substantially devoid of a ~~portion containing~~location that is included in more than two of the resonance cavities.

70. (Previously Presented) The system of claim 69, wherein the first section of the optical fiber contains at least a first pair of reflectors and the second section of the optical fiber contains a second pair of reflectors different than the first pair of reflectors.

71. (Previously Presented) The system of claim 70, wherein the first section of the optical fiber contains a first reflector of a third pair of reflectors different than the first and second pairs of reflectors, and the second section of the optical fiber contains a second reflector of the third pair of reflectors.

72. (Previously Presented) The system of claim 69, wherein the first Raman active material comprises P_2O_5.

73. (Previously Presented) The system of claim 72, wherein the first section of fiber contains one pair of reflectors.

74. (Previously Presented) The system of claim 73, wherein the pair of reflectors contained in the first section of fiber forms a resonance cavity having a resonance frequency

(c/λ_1), where

$$\lambda_1^{-1} = \lambda_p^{-1} - \lambda_a^{-1},$$

and (c/λ_a) is a frequency in a Raman gain spectrum of the Raman active material in the gain medium of the first section of the optical fiber.

75. (Previously Presented) The system of claim 72, wherein the second Raman active material comprises GeO_2.

76. (Previously Presented) The system of claim 75, wherein the second section of fiber contains two pairs of reflectors.

77. (Previously Presented) The system of claim 76, wherein one of the two pairs of reflectors contained in the second section of the optical fiber forms a resonance cavity has a resonance frequency (c/λ_2) and one of two pairs of reflectors contained in the second section of the optical fiber has a resonance frequency ($c/\lambda_{2'}$), where

$$\lambda_2^{-1} = \lambda_p^{-1} - \lambda_b^{-1},$$
$$\lambda_{2'}^{-1} = \lambda_2^{-1} - \lambda_c^{-1},$$

and (c/λ_b) and (c/λ_c) is each a frequency in a Raman gain spectrum of the Raman active material in a gain medium of the second section of the optical fiber.

78. (Previously Presented) The system of claim 77, wherein the first section of the optical fiber contains a first reflector of an additional pair of reflectors, and the second section of the optical fiber contains a second reflector of the additional pair of reflectors.

79. (Previously Presented) The system of claim 69, wherein the second Raman active material comprises GeO_2.

80. (Previously Presented) The system of claim 79, wherein the second section of fiber contains three pairs of reflectors.

81. (Previously Presented) The system of claim 79, wherein the first Raman active material comprises P_2O_5.

82. (Previously Presented) The system of claim 81, wherein the first section of the optical fiber contains a first reflector of an additional pair of reflectors, and the second section of the optical fiber contains a second reflector of the additional pair of reflectors.

83. (Previously Presented) The system of claim 82, wherein the additional pair of reflectors forms a resonance cavity having a resonance frequency (c/λ_1), where

$$\lambda_1^{-1} = \lambda_p^{-1} - \lambda_a^{-1},$$

and (c/λ_a) is a frequency in a Raman gain spectrum of the Raman active material in the gain medium of the first section of the optical fiber.

84. (Previously Presented) The system of claim 83, wherein the three pairs of reflectors contained in the second section of fiber form a resonance cavity have a resonance frequency of (c/λ_2), $(c/\lambda_{2'})$, $(c/\lambda_{2''})$, respectively, where

$$\lambda_2^{-1} = \lambda_1^{-1} - \lambda_b^{-1},$$
$$\lambda_{2'}^{-1} = \lambda_2^{-1} - \lambda_c^{-1},$$
$$\lambda_{2''}^{-1} = \lambda_{2'}^{-1} - \lambda_d^{-1},$$

and (c/λ_b), (c/λ_c) and (c/λ_d) is each a frequency in a Raman gain spectrum of the Raman active material in the gain medium of the second section of the optical fiber.

85. (Original) The system of claim 69, further comprising:

an energy source configured to emit energy at a wavelength λ_p; wherein

the optical fiber is configured so that energy emitted by the energy source at the λ_p can be coupled into the optical fiber.

86. (Original) The system of claim 85, wherein the energy source comprises a laser.

87. (Original) The system of claim 85, wherein the energy source is capable of lasing at the wavelength λ_p.

88. (Original) A system, comprising: an optical fiber comprising a gain medium having a Raman active material, the optical fiber being configured to receive energy at a wavelength λ_p; and

a plurality of reflectors disposed in the optical fiber, at least some of the plurality of reflectors forming resonance cavities in the optical fiber, each resonance cavity having a resonance frequency, the resonance frequency of each resonance cavity being different than the resonance frequency of any other cavity,

wherein the plurality of reflectors are configured so that when the optical fiber receives energy at the wavelength λ_p, a ratio of an output power at an output wavelength to a power received by the optical fiber at the wavelength λ_p is at least about 20% of a theoretical limit, the output wavelength being different than λ_p.

89. (Original) A system, comprising: an optical fiber containing a gain medium having a Raman active material, the optical fiber being configured to receive energy at a wavelength λ_p; and

a plurality of reflectors disposed in the optical fiber, at least some of the plurality of reflectors forming resonance cavities in the optical fiber, each resonance cavity having a resonance frequency, the resonance frequency of each resonance cavity being different than the resonance frequency of any other cavity,

wherein the plurality of reflectors are configured so that when the optical fiber receives energy at the wavelength λ_p, a ratio of total output power at output wavelengths to a power received by the optical fiber at the wavelength λ_p is at least about 20% of a theoretical limit, the output wavelength being different than λ_p.

90. (Original) The system of claim 88, further comprising:

an energy source configured to emit energy at a wavelength λ_p; wherein

the optical fiber is configured so that energy emitted by the energy source at the λ_p can be coupled into the optical fiber.

91. (Original) The system of claim 89, further comprising:

an energy source configured to emit energy at a wavelength λ_p; wherein

the optical fiber is configured so that energy emitted by the energy source at the λ_p can be coupled into the optical fiber.

92. (Original) A fiber, comprising:

an optical fiber containing a plurality of segments; and

at least three pairs of reflectors disposed in the optical fiber, each pair of reflectors forming a resonance cavity with a resonance frequency, each resonance cavity having an index, the index of each resonance cavity being different than the index of the other resonance cavities,

wherein, for at least one resonance cavity, the at least one resonance cavity overlaps with only two resonance cavities, one of the two resonance cavities having a resonance frequency that is one Raman Stokes shift higher than a resonance frequency of the at least one cavity, and the other of the two resonance cavities having a resonance frequency that is one Raman Stokes shift lower than the resonance frequency of the at least one cavity.

93. (Original) The system of claim 1, further comprising:

a splitter configured so that output energy from the fiber can be coupled into the splitter; and

a plurality of optical fibers configured so that energy output from the splitter can be coupled into one or more of the plurality of fibers.

94. (Original) The system of claim 1, further comprising:

a pump laser; and

a fiber laser coupled to the pump laser so that energy output by the pump laser

can be coupled into the fiber laser; wherein

the fiber is coupled to the fiber laser so that energy output by the fiber laser can be coupled into the fiber.

95. (Original) A system, comprising: an optical fiber comprising a gain medium having a Raman active material with a Raman gain spectrum, the optical fiber being configured to receive energy at a wavelength λ_p; and

at least three pairs of reflectors disposed in the optical fiber, each pair of reflectors forming a resonance cavity with a resonance frequency, each resonance cavity having an index, the index of each resonance cavity being different than the index of the other resonance cavities,

wherein, for a resonance cavity having an index with a value M, M being an integer having a value of at least one, the resonance cavity has a resonance frequency (c/λ_{sm}), where

$$\lambda_{sm}^{-1} = \lambda_p^{-1} - \sum_M \lambda_{rm}^{-1}$$

where (c/λ_{rm}) is a frequency within the Raman gain spectrum of the Raman active material contained in the gain medium and c is the speed of light, and the reflectors are configured so that at least two resonance cavities do not overlap.

96. (Original) The system according to claim 95, further comprising:

an energy source configured to emit energy at a wavelength λ_p; wherein

the optical fiber is configured to receive energy at a wavelength λ_p.